June 9, 1931. C. G. YOUNG 1,808,877

PROPELLANT CHARGE FOR PROJECTILES AND METHOD OF FORMING THE SAME

Filed Dec. 21, 1929

Fig. 1.

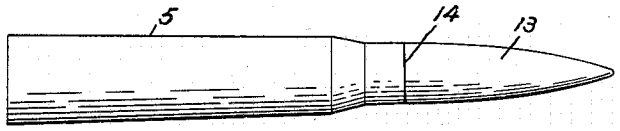


Fig. 2.

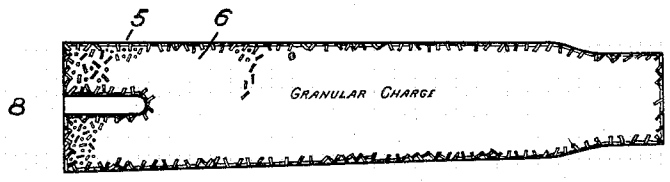


Fig. 4.

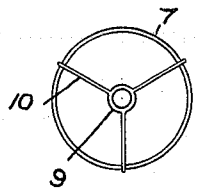


Fig. 3.

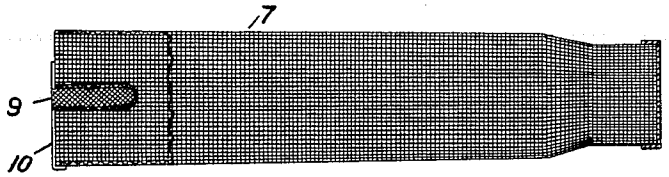


Fig. 6.

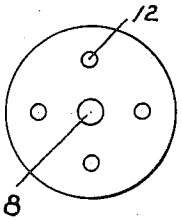
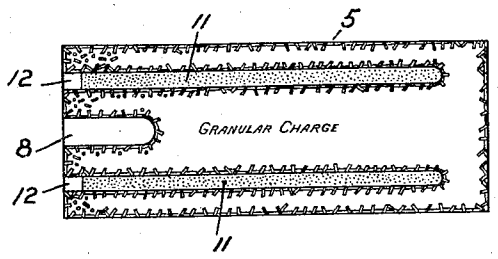


Fig. 5.



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UNITED STATES PATENT OFFICE

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PROPELLANT CHARGE FOR PROJECTILES AND METHOD OF FORMING THE SAME

Application filed December 21, 1929. Serial No. 415,800.

(GRANTED UNDER THE ACT OF MARCH 3, 1883, AS AMENDED APRIL 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to a propellant charge for projectiles and to a method of forming the same.

It has heretofore been proposed to provide combustible containers for the propellant charge of both fixed and separate loading ammunition with a view to contributing to the propelling power of the gases of the explosion. These containers have invariably been composed of solid and continuous sheet material of appreciable thickness into which the granular charge is placed.

Inasmuch as the factors affecting the form and size of the powder grain are the type and caliber of gun, weight of charge and projectile, rate of burning, and the regularity in ballistics, it is evident that the ungranulated containers can not effectively contribute to the propelling powder as intended.

In order, therefore, to provide a container which will possess the same characteristics as the principal granular charge, it is contemplated, in the present invention, to form the container from grains of powder held together and rendered continuous by external surface coating through means of a solvent. The charge which is formed in a novel manner by the use of a perforated container or cage has sufficient strength so that it may be cemented to the projectiles to provide a complete round of ammunition that will withstand handling.

With the foregoing and other objects in view, the invention resides in the novel assembly and arrangement of parts, and in the method and details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

A practical embodiment of the invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a view in side elevation of a round of ammunition formed and assembled in accordance with the invention;

Fig. 2 is a longitudinal sectional view through the propellant charge;

Fig. 3 is a view in side elevation of the cage employed in forming the charge shown in Fig. 2;

Fig. 4 is an end view of Fig. 3;

Fig. 5 is a longitudinal sectional view of a propellant charge formed with cavities for containing black powder; and

Fig. 6 is an end view of Fig. 5.

Referring to the drawings by numerals of reference:

The propellant charge is in the form of a cartridge case which it replaces and consists of a rigid container 5 composed of individual grains of powder cemented together by the action resulting from the external application of a solvent. The amount of solvent applied is restricted so that the identity of the individual grains is preserved. The main component 6 of the charge is constituted by grains of powder of the same character as those forming the container.

The method of forming the charge consists in first filling a perforated mold or wire cage 7 with loose powder, and applying a solvent to all exposed surfaces. This operation may be performed by brushing or spraying, by immersing the cage or by dipping only the outside exposed layer of the confined charge. By these methods the penetration of the solvent may be varied and the thickness of the envelop or container wall regulated. By forming only a thin wall, as illustrated in Fig. 2, the grains of the main charge are spaced to afford good

ıition. However, under certain circumınces it may be desirable to solidify the tire charge by surface treatment of all the grains with the solvent, thereby obining a uniform compactness of loading d a uniform flame transmission through l charges made in this manner.

In the case of smokeless powder numerous lvents are known and can be used such as her-alcohol, acetone, ethyl acetate-alcohol, c. Acetone alone gives an almost instanneous cementing action but it also gives hard smooth surface to the grains which nders ignition difficult. In order to comensate for this effect an easily ignitable ıbstance soluble in acetone may be includ1 in the solvent to restore to the grain its acility of ignition. Such substances are itroglycerine, mannitol hexanitrate, etc. t the same time, water-proofing ingredients ıay be incorporated in the solvent.

Another method of partly avoiding a forıation of too hard and smooth a surface on he powder grains is to mix the solvent with highly volatile liquid such as ether. For xample, a solvent consisting of only 5% cetone and 95% ether produces cementing f the grains, the action apparently being hat the solvent rapidly evaporates from he surface of the grains but due to surace tension it adheres to all points of conact of adjoining grains for a sufficient time o insure cementing at these points.

Referring to Figs. 2 and 5, the method of nolding the charge in a cage provides a convenient means for forming one or more cavities or pockets 8 therein, the mold or former 9 being positioned in the cage 7 by means of arms 10. These pockets can be used to carry charges 11 of black powder, preferably in the form of hollow pellets and retained by plugs 12 of smokeless powder cemented in place. The central pocket would carry a primer and primer charge.

The pockets 8 and the charges 11 may be formed as individual units by placing and sealing the black powder in containers of smokeless powder. Such containers in any form or size may be made by using perforated cages and pouring out the loose contents after the exterior coated surface has dried in the identical manner practised in forming the container 5.

For separate loading ammunition the propellant charge which is sufficiently rigid to permit handling as units may be wrapped in water-proof paper and packed in paper cartons.

For fixed ammunition the propellant charge is cemented to the base of the projectile 13 as shown at 14 in Fig. 1. Since there is no cartridge case that must be extracted after firing the round it is not necessary to provide a cannelure.

I claim:

1. A propellant charge comprising a container having pockets and formed of a plurality of individual grains of powder cemented together without loss of identity, a main charge of loose grains of powder within the container and having the same characteristics as the grains forming the container, and inserts of black powder in the pockets of the container.

2. A propellant charge comprising a container having pockets and formed of a plurality of individual grains of powder cemented together without loss of identity, a main charge of grains of powder within the container and having the same characteristics as the grains forming the container and inserts of black powder in the pockets of the container.

3. A propellant charge comprising a container having pockets and formed of a plurality of individual grains of powder cemented together, a main charge of grains of powder within the container and having the same characteristics as the grains forming the container, and inserts of black powder in the pockets of the container.

4. A propellant charge comprising a container formed of a plurality of individual grains of powder cemented together, a main charge of grains of powder within the container and having the same characteristics as the grains forming the container.

5. A propellant charge comprising a rigid unit formed of an irregularly assembled mass of powder grains which has partially been submitted to the action of a solvent.

6. A propellant charge comprising a rigid unit formed of an irregularly assembled mass of powder grains which has been submitted to the action of a solvent.

7. A method of forming a propellant charge unit which consists in placing loose grains of powder in a cage, applying a solvent containing an ignition facilitating agent to the outer layer of the powder to cement the grains together and form a rigid envelop without altering the identity of the grains and removing the unit from the cage.

8. A method of forming a propellant charge unit which consists in placing loose grains of powder in a cage, applying a solvent to the outer layer of the powder to cement the grains together and form a rigid envelop without altering the identity of the grains and removing the unit from the cage.

9. A method of forming a propellant charge unit which consists in placing loose grains of powder in a cage, applying a solution consisting of approximately 5% acetone and 95% ether to the outer layer of powder grains to cement the grains together, and removing the unit from the cage.

10. A method of forming a combustible container which consists in placing loose

grains of powder in a cage, applying a solvent to the exposed layer of the powder to cement the grains and form an envelop, and removing the loose uncemented grains.

11. A method of forming a combustible container which consists in placing loose grains of powder in a cage, applying a solvent to the powder to cement the grains and form an envelop, and removing the container thus formed from the cage.

CECIL G. YOUNG.